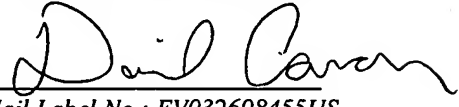


PATENT APPLICATION COVER SHEET
Attorney Docket No. 2000.68587

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October 22, 2003
Date


Express Mail Label No.: EV032698455US

CORDLESS RATCHET WRENCH

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CORDLESS RATCHET WRENCH

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a wrench, and more particularly to a cordless electrical ratchet wrench that has a battery set and is convenient in use.

2. Description of Related Art

Wrenches are widely used for fastening or releasing a fastener, such as a bolt or a nut. To drive the wrench to operate, manual power, compressed air or electrical power is commonly used. With a pneumatic or an electrical wrench, the fastener can be tightened or loosened rapidly and conveniently.

However, the conventional pneumatic or electrical wrench must be connected to a power source, and to transport the power source is frequently inconvenient, and sometimes even impossible. Therefore, the conventional pneumatic or electrical wrench cannot be used in a location far away from the power source, for example outdoors. Thus, the use of the conventional pneumatic or electrical wrench is inconvenient.

To overcome the shortcomings, the present invention tends to provide a wrench to mitigate or obviate the aforementioned problems.

SUMMARY OF THE INVENTION

The main objective of the invention is to provide an electrical ratchet wrench that has a battery set so that the wrench is cordless and is convenient in use at any desired location. The electrical ratchet wrench has a body, a motor, a battery set, a switch, a planet gear assembly, a connecting collar, a head and a ratcheting device. The body is composed of two half shells each having an outer

1 side and an inner side. The motor is received in the body and has an output shaft
2 with a pinion. The battery set is detachably received in the body and is
3 electrically connected to the motor. The switch is electrically connected between
4 the motor and the battery set. The planet gear assembly is received in the body
5 and has a rotating base, a stub, multiple planet gears and a stationary collar. The
6 connecting collar is attached to one end of the body and securely holds the
7 stationary collar in the connecting collar. The head is attached to the connecting
8 collar. The ratcheting device is received in the head for driving a fastener to
9 rotate and has a driven shaft extending into and engaging with the engaging hole
10 in the stub on the rotating base. Accordingly, a cordless electrical ratchet wrench
11 is provided and is convenient in use.

12 Other objects, advantages and novel features of the invention will
13 become more apparent from the following detailed description when taken in
14 conjunction with the accompanying drawings.

15 BRIEF DESCRIPTION OF THE DRAWINGS

16 Fig. 1 is an exploded perspective view of a first embodiment of an
17 electrical ratchet wrench in accordance with the present invention;

18 Fig. 2 is a side plan view in partial section of the ratchet wrench in Fig. 1;

19 Fig. 3 is an exploded perspective view of a second embodiment of an
20 electrical ratchet wrench in accordance with the present invention; and

21 Fig. 4 is an exploded perspective view of a third embodiment of an
22 electrical ratchet wrench in accordance with the present invention.

23 DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

24 With reference to Figs. 1 and 2, an electrical ratchet wrench in

1 accordance with the present invention comprises a body (10), a motor (14), a
2 battery set (15), a switch (19), a planet gear assembly (16), a connecting collar
3 (17), a head (20) and a ratcheting device (21). The body (10) is composed of two
4 half shells (11,12) and optionally has two outer covers (13) and two inner holders
5 (132). Each shell (11,12) has an outer side and an inner side. In an optional
6 embodiment, the half shells (11,12) are combined together by fasteners (not
7 numbered), such as screws. The two optional outer covers (13) are attached
8 respectively to the outer sides of the half shells (11,12). The inner holders (132)
9 are made of an insulating material and are attached respectively to the inner sides
10 of the half shells (11,12).

11 The motor (14) is received in the body (10) and is optionally received
12 and held between the inner holders (132). The motor (14) has an output shaft (not
13 numbered) with a pinion (not numbered). In an optional embodiment, a holding
14 base (144) is received in the body (10) to support the output shaft of the motor
15 (14).

16 The battery set (15) is detachably received in the body (10) and is
17 electrically connected to the motor (14). In a preferred embodiment, the battery
18 set (15) is rechargeable. The ratchet wrench may have an adapter (142) with two
19 contacting legs (not numbered) received in the body (10) to electrically contact
20 with two electrodes (not numbered) of the battery set (15).

21 The switch (19) is electrically connected between the motor (14) and the
22 adapter (142) that is connected to the battery set (15). In an optional embodiment,
23 the switch (19) is received in the body (10), and the wrench further has a button
24 (192), a resilient strip (194) and a biasing member (196). The button (192) is

1 attached between and exposed from the half shells (11,12) of the body (10). The
2 resilient strip (194) is received in the body (10) and has two ends connected
3 respectively to the button (192) and the switch (19). The biasing member (196) is
4 received in the body (10) to support the button (192) and optionally is a spring.
5 When the button (192) is pushed, the switch (19) is switched by the transmission
6 of the resilient strip (194). Accordingly, the electrical power provided by the
7 battery set (15) will be supplied to the motor (14) or will be cut off from the
8 motor (14). In an alternative embodiment, the switch (19) is exposed from the
9 body (10) and is pushed directly by a user.

10 The planet gear assembly (16) is received in the body (10) and
11 comprises a rotating base (162), a stub (164), multiple planet gears (166) and a
12 stationary collar (168). The rotating base (162) is rotatably received in the body
13 (10) and has a first side and a second side. The stub (164) protrudes from the first
14 side of the rotating base (162) and has a distal end and an engaging hole (not
15 numbered) defined in the distal end. The planet gears (166) are rotatably
16 attached on the second side of the rotating base (162) and engage with the pinion
17 on the output shaft of the motor (14). The stationary collar (168) is securely held
18 in the body (10) and has an outer surface and an inner gear (not numbered)
19 engaging with the planet gears (166).

20 Accordingly, when the switch (19) is switched on, the electrical power
21 provided by the battery set (15) will be supplied to the motor (14) to drive the
22 output shaft to rotate. With the engagement between the planet gears (166) and
23 the inner gear in the stationary collar (168), the rotating base (162) will be driven
24 to rotate.

1 In an optional embodiment, a gasket (146) is mounted around the output
2 shaft and is located between the planet gears (166) of the planet gear assembly
3 (16) and the holding base (144) to keep the planet gears (166) from touching the
4 holding base (144).

5 The connecting collar (17) is attached to one end of the body (10) and
6 securely holds the stationary collar (168) in the connecting collar (17). The
7 connecting collar (17) has an inner surface. To securely hold the stationary collar
8 (168) in the connecting collar (17), two ribs (not numbered) are longitudinally
9 formed on the outer surface of the stationary collar (168). The connecting collar
10 (17) has two recesses (not numbered) defined in the inner surface to respectively
11 receive the ribs on the stationary collar (168). With the engagements of the ribs
12 and the corresponding recesses, the stationary collar (168) will not rotate relative
13 to the connecting collar (17).

14 The head (20) is attached to the connecting collar (17) to be securely
15 held at one end of the body (10). In an optional embodiment, the head (20) has an
16 outer thread (not numbered), and the connecting collar (17) has an inner thread
17 (not numbered) screwing with the outer thread on the head (20). The ratchet
18 wrench may have a positioning ring (18) mounted around the head (20) and
19 abutting against one end of the body (10). The positioning ring (18) has an inner
20 thread (not numbered) screwing with the outer thread on the head (20).

21 The ratcheting device (21) is received in the head (20) for driving a
22 fastener to rotate and has a driven shaft (22) extending into and engaging with
23 the engaging hole in the stub (164) on the rotating base (162). The detailed
24 structure of the ratcheting device (21) is substantially the same as that of a

1 conventional one and is not an essential part of the present invention, so the
2 detailed structure of the ratcheting device (21) is not further described.

3 Accordingly, when the switch (19) is switched on, the rotating base (162)
4 will be driven to rotate relative to the body (10). The driven shaft (22) will be
5 driven to rotate, and the ratcheting device (21) is driven to operate to rotate a
6 fastener or a tool head connected to the ratcheting device (21). Consequently, a
7 cordless electrical ratchet wrench is provided, and the ratchet wrench in
8 accordance with the present invention can be taken to any desired place for work.
9 When the battery set (15) is out of power, a new battery set can be fitted to keep
10 the ratchet wrench working. With a rechargeable battery set (15), the battery set
11 (15) can be recharged when the battery set (15) is out of power. The use of the
12 cordless electrical ratchet wrench in accordance with the present invention is
13 convenient in use.

14 With reference to Fig. 3, a second embodiment of a ratchet wrench in
15 accordance with the present invention has a structure the same as the first
16 embodiment previously described except that each half shell (11',12') has a neck
17 (112,122) protruding from the half shell (11',12') at the end to which the head
18 (20) is attached. A holding ring (18) is mounted around the necks (112,122) on
19 the half shells (11',12'). With the arrangement of the holding ring (18), the
20 combination between the half shells (11',12') is improved.

21 With reference to Fig. 4, a third embodiment of a ratchet wrench in
22 accordance with the present invention has a structure the same as the first
23 embodiment previously described except that one of the half shells (12'') has an
24 annular neck (124) formed on the half shell (12'') at the end to which the head

1 (20) is attached. The half shell (12'') with the neck (124) has a length longer than
2 that of the other half shell (11'').

3 Even though numerous characteristics and advantages of the present
4 invention have been set forth in the foregoing description, together with details
5 of the structure and function of the invention, the disclosure is illustrative only,
6 and changes may be made in detail, especially in matters of shape, size, and
7 arrangement of parts within the principles of the invention to the full extent
8 indicated by the broad general meaning of the terms in which the appended
9 claims are expressed.